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## From tagging to theorizing: deepening engagement with cultural heritage through crowdsourcing

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**DIGITAL**

**From Tagging to Theorizing: Deepening Engagement with Cultural Heritage through Crowdsourcing**

MIA RIDGE

**Abstract** Crowdsourcing, or “obtaining information or services by soliciting input from a large number of people,” is becoming known for the impressive productivity of projects that ask the public to help transcribe, describe, locate, or categorize cultural heritage resources. This essay argues that crowdsourcing projects can also be a powerful platform for audience engagement with museums, offering truly deep and valuable connection with cultural heritage through online collaboration around shared goals or resources. It includes examples of well-designed crowdsourcing projects that provide platforms for deepening involvement with citizen history and citizen science; useful definitions of “engagement”; and evidence for why some activities help audiences interact with heritage and scientific material. It discusses projects with committed participants and considers the role of communities of participants in engaging participants more deeply.

**INTRODUCTION**

For museums, libraries, and archives with significant backlogs of un-digitized, under-catalogued, and un-researched material, crowdsourcing is a useful framework for inviting audiences to help with the resource-intensive tasks of creating or improving content about collections. There is plentiful evidence of the productivity of crowdsourcing in digitizing content, improving metadata, or identifying specimens from cultural heritage: see the lines of corrected text in *Trove*; pages transcribed in *Old Weather*; or animals identified in *Serengeti* (Proctor 2013; Romeo and Blaser 2011; Causer and Wallace 2012; Holley 2010; Kosmala 2013). Echoing themes from Nancy Proctor’s article “Crowdsourcing—An Introduction: From Public Goods to Public Good” in this journal (January 2013), I argue here that participation in crowdsourcing should also be recognized as a valuable form of public engagement

with cultural heritage. Well-designed crowdsourcing projects can help meet the core missions of museums (Poole 2013) by connecting people, culture, history, and collections while providing the public with platforms for enjoyable, meaningful activity.

This article reviews the evidence for a relationship between active participation through crowdsourcing and engagement with cultural heritage objects and knowledge. Its inception lies a few years in the past, when I was inspired by the early *steve.museum* crowdsourcing project to make crowdsourcing games based on “difficult” objects from science and social history museum collections. While evaluating the games, I noticed that participants were talking about the objects after they finished playing the games (Ridge 2011b). I discovered that two art historian friends, who had never shown any interest in astronomy collections before joining this crowdsourcing activity, were discussing the difference between heliocentric and geocentric

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1 astrolabes on Facebook. My curiosity was  
 2 piqued. What was it about playing a crowd-  
 3 sourcing game that engaged them when other  
 4 encounters with the collections had not? Then,  
 5 in mid-June 2013, the *Oxford English Dictionary*  
 6 —itself an example of proto-crowdsourcing—  
 7 included the term “crowdsourcing” for the first  
 8 time. The *OED* definition: “The practice of  
 9 obtaining information or services by soliciting  
 10 input from a large number of people, typically  
 11 via the Internet and often without offering com-  
 12 pensation.” This definition is adequate for com-  
 13 mercial crowdsourcing, but, in implying  
 14 tangible “compensation,” it understates the  
 15 value for participants of engaging in cultural  
 16 heritage crowdsourcing projects.

17 In this article, I provide a brief overview of  
 18 content, tasks, motivations, and participants  
 19 typical of crowdsourcing projects in galleries,  
 20 libraries, archives, and museums (or “GLAMs”).  
 21 I consider how crowdsourcing in museums dif-  
 22 fers from more traditional forms of user-gener-  
 23 ated content. I present some design techniques  
 24 for encouraging initial, on-going, and more  
 25 engaged participation; these are drawn from suc-  
 26 cessful GLAM crowdsourcing projects, casual  
 27 game design, and scaffolding theory. I review  
 28 the evidence for crowdsourcing as a form of pro-  
 29 ductive engagement with cultural heritage and  
 30 consider the role of project structures and com-  
 31 munities of practitioners in supporting the  
 32 development of skills and deeper engagement  
 33 with cultural heritage.

### 34 **DEFINING CROWDSOURCING IN** 35 **CULTURAL HERITAGE**

36 “Crowdsourcing” was coined in 2006 when  
 37 Jeff Howe and Mark Robinson riffed on the  
 38 term “outsourcing” to describe “the act of a com-  
 39 pany or institution taking a function once per-  
 40 formed by employees and outsourcing it to an

undefined (and generally large) network of peo-  
 ple in the form of an open call” (Howe 2006b),  
 or more simply, using “the spare processing  
 power of millions of human brains” (Howe  
 2006a). However, the discomfort of cultural  
 heritage and academic institutions with both  
 the terms “crowd” and “outsourcing” is appar-  
 ent in many online and in-person discussions of  
 crowdsourcing. Commenters often question the  
 size and composition of the “crowd” and express  
 discomfort with the perceived threat of replac-  
 ing digitization and research staff with volun-  
 teers. However, the term has enough traction to  
 provide a convenient short-hand name for a par-  
 ticular type of participatory activity. As Estelles-  
 Arolas and Gonzalez-Ladron-de-Guevara  
 point out, crowdsourcing is evolving to the  
 extent that the label may be applied to almost  
 any Internet-based collaborative activity (2012).  
 Lines are also blurred between related terms: for  
 example, “cognitive surplus” (Shirky 2011);  
 “human computation,” in which human effort is  
 used for “tasks that computers cannot yet per-  
 form” such as complex visual or semantic pro-  
 cessing (Law and von Ahn 2009); and “social  
 computing” and “collective intelligence” (Quinn  
 and Bederson 2011).

Museums sometimes conflate crowdsourc-  
 ing with “user-generated content” projects on  
 online platforms or in-gallery interactives. This  
 habit can cause confusion when trying to under-  
 stand motivations for participation and the  
 value subsequently placed on the content that  
 has been created. While crowdsourcing is clo-  
 sely related to Web 2.0-style user-generated  
 content (UGC) projects, and raises similar  
 issues about the validation and incorporation of  
 audience-created content into collections docu-  
 mentation and other museum informatics sys-  
 tems, crowdsourcing projects only offer tasks  
 that will contribute to the specific, shared, and  
 substantial goals of the project. The Citizen Sci-

1       ence Alliance requires that all their crowdsourc-  
 2       ing projects answer “a real scientific research  
 3       question” and “must never waste the ‘clicks,’ or  
 4       time, of volunteers” (Romeo and Blaser 2011).  
 5       Dunn and Hedges state that “humanities  
 6       crowdsourcing” requires “a clearly-defined  
 7       humanities direction and/or research question”  
 8       (2012). Peter Samis’s memorable phrase sum-  
 9       marizes the fate of many UGC projects: “We  
 10      opened the door to let visitors in... then we left  
 11      the room.”<sup>1</sup> The value for the writer of a com-  
 12      ment and the value of that content for a later  
 13      reader in simple “have your say” activities is  
 14      often not commensurate (Shirky 2012; Clari  
 15      and Graham 2012). Holley differentiates  
 16      between social engagement—“giving the public  
 17      the ability to communicate with us and each  
 18      other”—as a method, and crowdsourcing as the  
 19      process through which a group working collabo-  
 20      ratively achieves a “shared, usually significant,  
 21      and large goal” (2010). To summarize these def-  
 22      initions and the related literature, crowdsourc-  
 23      ing is emerging as a form of engagement with  
 24      cultural heritage that contributes toward a  
 25      shared, significant goal or research area, by ask-  
 26      ing the public to undertake tasks that cannot be  
 27      done automatically, in an environment where  
 28      the tasks, goals (or both) provide inherent  
 29      rewards for participation.

30       A number of related terms describe crowd-  
 31       sourcing projects based in humanistic or scien-  
 32       tific disciplines. Citizen science, where  
 33       “volunteers from the general public assist scien-  
 34       tists in conducting research” (Raddick et al.  
 35       2010), is well established. Citizen history (Fran-  
 36       kle 2011) and the U.S. National Archives term  
 37       “citizen archivist” are gaining ground. The long  
 38       tradition of volunteering in cultural heritage  
 39       encompasses both citizen science and citizen  
 40       history (Proctor 2013). The role of traditional  
 41       volunteer bureaus in matching people to oppor-  
 42       tunities has been supplemented by online citizen

science portals. As an evolution of citizen partic-  
 ipation in collection, research, and observation,  
 crowdsourcing as we know it has been trans-  
 formed by technology, but not created by it.  
 Digital technology is able to provide almost  
 instantaneous data-gathering and feedback,  
 automatic validation, and the ability to reach  
 both broad and niche groups through loose net-  
 works. For museums, technology has also  
 helped manage the limitations of physical space,  
 conservation, location, and opening hours, all of  
 which previously affected access to collections.

### **SOURCE MATERIALS, TASKS, OUTCOMES AND PLATFORMS**

Tasks and source materials in cultural heri-  
 tage crowdsourcing projects tend to fall into  
 common groups: the collection, description,  
 transcription, or specialist digitization of mate-  
 rial culture, natural history, and historic docu-  
 ments. These contribute to the transformation  
 and gathering of knowledge about cultural heri-  
 tage. Crowdsourcing projects often divide up  
 large tasks (like digitizing an archive) into smal-  
 ler, more manageable tasks (like transcribing a  
 name, a line, or a page); this method has helped  
 digitize numerous primary sources. In cultural  
 heritage crowdsourcing, easy-to-complete “mi-  
 crotasks,” or “one-off tasks requiring minimal  
 effort” (McGonigal 2008) enable a broad base of  
 potential participants who would find more  
 complex or time-consuming tasks less satisfying.  
 Tasks can be described as the “atoms” of crowd-  
 sourcing, and can be linked together to form lar-  
 ger actions that contribute to project goals.

Oomen and Aroyo categorized crowdsourc-  
 ing within cultural heritage in terms of “tangible  
 outcomes,” including “correction and transcrip-  
 tion,” “contextualization,” the collection of  
 objects, “classification,” and “co-curation”  
 (2011). Task types and outcomes are often

1 closely linked—for example, the act of connect-  
 2 ing museum objects to each other, or to authority  
 3 records, creates relationship data—but the link  
 4 is not always straightforward. Tags generated by  
 5 tagging tasks can be divided into three general  
 6 classes (Sen et al. 2006) and applied to the tag-  
 7 ging of art works. Arends et al. distinguished  
 8 between subjective tags (opinions and interpre-  
 9 tations, useful for self-expression), personal tags  
 10 (useful for content organization), and factual  
 11 tags (2012). Other content created through cul-  
 12 tural heritage crowdsourcing includes quality  
 13 ratings, subjective rankings, spatial coordinates,  
 14 extended creative or factual descriptions, per-  
 15 sonal experiences or memories, family records,  
 16 and even game levels (Preloaded undated);  
 17 through tasks as varied as tagging, transcription,  
 18 geo-location, and creating or sharing media such  
 19 as text, images, audio, and video.

20 Cultural heritage crowdsourcing platforms  
 21 range from games for creating metadata about  
 22 objects (Ridge 2011a; Flanagan and Carini  
 23 2012) to projects based on existing social plat-  
 24 forms like Flickr Commons, online newspaper  
 25 archives (Holley 2010), or specialist sites for  
 26 transcribing hand-written correspondence  
 27 (Moyle, Tonra, and Wallace 2011), each of  
 28 which is designed to suit particular motivations  
 29 for and types of participation. It is outside the  
 30 scope of this essay, but crowdfunding is a related  
 31 dynamic field which will yield useful case studies  
 32 for future research.

## 33 PARTICIPANTS

34 Unlike commercial crowdsourcing, partici-  
 35 pation in cultural heritage crowdsourcing is driv-  
 36 en by pleasure, not profit. Rather than  
 37 monetary recompense, GLAM projects provide  
 38 an opportunity for altruistic acts, activated by  
 39 intrinsic motivations, applied to inherently  
 40 engaging tasks, encouraged by a personal inter-

est in the subject or task. In order to understand  
 how projects can create deeper involvement  
 with cultural heritage, it is necessary to consider  
 why participants start and continue contribut-  
 ing to crowdsourcing projects.

We might categorize participants in cultural  
 heritage crowdsourcing projects groups in two  
 ways: those who are intentionally participating  
 in crowdsourced tasks for the intrinsic rewards;  
 and those whose contributions are a side effect of  
 their participation in other core activities. Inten-  
 tional participants could be considered “digital  
 volunteers” and include people who are passion-  
 ate about the relevant subject, people who like  
 doing the task offered in the project or the source  
 material used, and people who are unable to vol-  
 unteer in venue opening hours or locations.

Museums can find the open nature of  
 crowdsourcing calls for participants to be chal-  
 lenging, because tasks are undertaken online by  
 possibly anonymous participants. To counter  
 this, museums use terms such as “community-  
 sourcing,” or working with people who already  
 have a relationship with an institution (Phillips  
 2010), and “nichesourcing,” where tasks are  
 “distributed amongst a small crowd of amateur  
 experts” (de Boer et al. 2012). Some projects  
 cannot be as “open to all” as museums might  
 like, because participants are limited to those  
 who have or are willing to learn skills such as  
 paleography or georectification.

While some participants in crowdsourcing  
 projects are new to GLAM activities and  
 resources, others are experts in the relevant field.  
 Citizen historians are perfect examples of “pro-  
 ams” (professional amateurs): “self motivated,  
 enthusiastic, and dedicated” amateurs who work  
 to professional standards (Leadbeater and  
 Miller 2004; Terras 2010). As an example of the  
 blurred lines between professional and amateur  
 historians, people interviewed for my current  
 research have included trained historians who

1 work in other fields while enjoying hobbies that  
 2 let them keep up their historical research skills;  
 3 academics who learned their historical research  
 4 skills on the job; and self-taught researchers with  
 5 decades of experience as practicing historians.

## 6 **DESIGNING FOR PARTICIPATION**

7  
 8  
 9 The following section outlines some design  
 10 considerations for encouraging and deepening  
 11 participation through museum crowdsourcing  
 12 projects, including design techniques such as  
 13 microtasks, scaffolding, and related concepts  
 14 such as casual game design and “flow.”

15 As crowdsourcing becomes more popular, a  
 16 growing body of literature discusses the chal-  
 17 lenges of engaging mass audiences while com-  
 18 petition for participants increases. Museums  
 19 find it useful to provide easy ways to begin, so  
 20 that potential participants who come across a  
 21 project are immediately engaged. Designing a  
 22 seductive initial task “that can be accomplished  
 23 quickly and easily” is key: “It is less important  
 24 at the onset to make something interesting or  
 25 challenging than it is to make something easy”  
 26 (McGonigal 2008). Snoek et al. described how  
 27 the audio-visual archive-based crowdsourcing  
 28 game *Waisda?* designed microtasks that led  
 29 users to increase their level of activity by provid-  
 30 ing feedback “just by clicking buttons,” or vali-  
 31 dating another user’s tag with a “thumbs up.”  
 32 Interactions were designed to entice the user  
 33 into increasing the level of participation; users  
 34 who press the “thumbs-down button” are asked  
 35 to correct the label (2010).

## 36 **SCAFFOLDED DESIGNS IN CULTURAL** 37 **HERITAGE CROWDSOURCING**

38  
 39  
 40 It may sound paradoxical, but constraints in  
 41 participatory interfaces can encourage engage-  
 42 ment. Scaffolding supports novices “by limiting

the complexities of the learning context” and  
 gradually “fading” or removing those limits  
 (Dabbagh 2003). Nina Simon observes that the  
 best participatory experiences in museums are  
 “scaffolded to help people feel comfortable  
 engaging in the activity” by building their confi-  
 dence. In museum projects, scaffolding supports  
 increased participation by providing “clear roles  
 and information about how to participate”  
 (Simon 2010). Scaffolding is designed for face-  
 to-face educational environments where teach-  
 ers can monitor student performance and adjust  
 lessons accordingly. However, some principles  
 can be extrapolated to guide the design of audi-  
 ence experiences online.

The New York Public Library’s hugely suc-  
 cessful crowdsourcing project *What’s on the*  
*Menu?* focuses on digitizing its collection of  
 historic menus. The value in reducing task com-  
 plexity is evident on its closely scaffolded inter-  
 face designed around the key tasks of  
 transcribing menu items and prices. By remov-  
 ing any uncertainty about how to fill in the two  
 text boxes, the interface design reduces cogni-  
 tive overhead, making the task simpler and  
 more enjoyable. The whole site is designed to  
 minimize barriers and encourage participation  
 in clearly defined tasks.

Some of the less successful projects I have  
 analyzed have failed in part because their initial  
 task was too complex or required too much  
 domain-specific knowledge, necessitating awk-  
 ward and ineffective pre-task tutorials or  
 instruction sheets, or the project was too loosely  
 defined, with no clear feedback when a task was  
 completed successfully.

## 43 **THE INTERSECTION BETWEEN SCAFF-** 44 **OLDING AND DESIGN FOR CASUAL GAMES**

Games can also be effective drivers of parti-  
 cipation in museums (Birchall et al. 2012).

1 Games provide useful demonstrations of the  
 2 power of scaffolded interactions.<sup>2</sup> Crowdsourc-  
 3 ing games, or Games with a Purpose (GWAP),  
 4 in which “players perform a useful computation  
 5 as a side effect of enjoyable game play,” proved  
 6 that games could bring mass audiences to com-  
 7 putational problems such as describing the con-  
 8 tent of images with tags (von Ahn and Dabbish  
 9 2004; 2008). Flanagan and Carini found that  
 10 GLAM crowdsourcing games could generate  
 11 more content per participant than non-game  
 12 interfaces (2012). Other crowdsourcing games  
 13 in this area include games about art (Brooklyn  
 14 Museum’s *Tag! You’re It!* and *Freeze Tag!* [Bern-  
 15 stein 2008; 2009]); contemporary audio-visual  
 16 material (*Waisda?* [Oomen and Aroyo 2011;  
 17 Snoek et al. 2010]); and historic newspapers  
 18 (*DigitalKoo!*). Currently, most successful  
 19 crowdsourcing games are focused on microtasks  
 20 like tagging, validating data, or transcribing  
 21 small sections of content within larger collec-  
 22 tions.

23 The precepts for casual game design, which  
 24 are drawn from years of practical experience in  
 25 the gaming sector, encapsulate some of the  
 26 principles of design for increased participation  
 27 that have evolved from scaffolding theory.  
 28 Casual games are “games with a low barrier to  
 29 entry that can be enjoyed in short increments”  
 30 (Casual Games SIG 2009); these include puz-  
 31 zles, word games, board games, card games, and  
 32 trivia games. Features of casual games like *Soli-  
 33 taire* and *Angry Birds* include easy-to-  
 34 learn game-play, simple controls, addictive and  
 35 “forgiving” game-play with a low risk of failure,  
 36 and inclusive, accessible themes (Casual Games  
 37 SIG 2009); these characteristics make games  
 38 ideal for crowdsourcing (Ridge 2011a; 2011b).  
 39 A key design principal—carefully managed  
 40 complexity levels with a shallow learning curve  
 41 and guidance through early levels—is clearly  
 42 related to scaffolding. For museums with lim-

ited design budgets and large collections to  
 cover, the International Game Developers  
 Association recommends favoring “a variety of  
 content over a variety of mechanics in a single  
 game”; it reports that adding similar content to  
 the same game structure leads the player to  
 “greater feelings of mastery” (Casual Games  
 SIG 2009). An additional benefit is that grow-  
 ing feelings of mastery can help participants stay  
 engaged.

Crowdsourcing games can build tutorials  
 for new skills into the gameplay itself at the  
 point where they are needed (Ridge 2011a). It  
 seems that casual game design operationalizes  
 scaffolding theory in ways that usefully inform  
 design for cultural heritage crowdsourcing.

## MOTIVATIONAL FRAMEWORKS FOR PARTICIPATION IN CROWDSOURCING

Understanding why people participate in  
 crowdsourcing is important in designing for  
 participant recruitment and retention. Project  
 marketing and instructional messages that  
 match participant motivations have enhanced  
 “persuasive impact” and help volunteers find  
 more enjoyable and satisfying roles that match  
 their motivations (Clary et al. 1998; Romeo  
 and Blaser 2011). In order to find research on  
 motivations for participation in crowdsourcing  
 projects that did not offer monetary recom-  
 pense, I turned to research into citizen science  
 and other “community-based peer-production  
 projects” where people participate in collabora-  
 tive efforts to create “publicly available knowl-  
 edge-based products” such as open source  
 software or the collaboratively written website  
 Wikipedia (Nov 2007; Nov, Arazy, and Ander-  
 son 2011). So why do people participate when  
 they are not being paid? Brabham reported that  
 several studies have located the primary motiva-  
 tor of participation in open source projects in

1 “the pleasure found in doing hobbies” (2008).  
 2 Research for citizen science projects discovered  
 3 that the most important motivations for volun-  
 4 tary participation were the collective (“the  
 5 importance attributed to the project’s goals”)  
 6 and intrinsic fun, or “the enjoyment associated  
 7 with participation in the project” (Nov, Arazy,  
 8 and Anderson 2011). Raddick et al. identified  
 9 the main benefits for participants in the citizen  
 10 science project *Galaxy Zoo*: enjoyment, commu-  
 11 nity, the ability to participate in real science, and  
 12 recognition for their participation (2009). Oo-  
 13 men and Aroyo discussed two groups of  
 14 “motivational factors” in cultural heritage  
 15 crowdsourcing: “connectedness and member-  
 16 ship,” and “sharing and generosity” (2011).  
 17 Many researchers have found that community  
 18 and social interactions are important motivators  
 19 for participation (Nov, Arazy, and Anderson  
 20 2011; Clary et al. 1998). Looking to pre-online  
 21 volunteering, Holmes found that “social oppor-  
 22 tunities” and “colleagues” were important moti-  
 23 vations for continued volunteering in the  
 24 heritage sector (2003). These various motiva-  
 25 tions can be grouped into altruistic, intrinsic,  
 26 and extrinsic motivations.

27 Unlike most commercial projects, cultural  
 28 heritage crowdsourcing projects are well posi-  
 29 tioned for appeals to altruism. Oomen et al.  
 30 suggest that the use of specialist interfaces that  
 31 reinforce the altruistic nature of the activity  
 32 increases participation (2010). This has impli-  
 33 cations for the design of crowdsourcing plat-  
 34 form functionality and interface design. Trant  
 35 recommends demonstrating the use of data so  
 36 that players can see the impact of their contribu-  
 37 tion (2009). In an earlier project, I learned that  
 38 “validating procrastination” by offering mes-  
 39 sages supporting altruistic motivations helped  
 40 participants justify their time on the activity and  
 41 could increase levels of participation (Ridge  
 42 2011a). My review of crowdsourcing projects

found that intrinsic motivations—an activity  
 worth doing for its own sake (Csikszentmihalyi  
 and Hermanson 1995)—for participating in  
 museum crowdsourcing include fun, the plea-  
 sure in doing hobbies, enjoyment in learning,  
 mastering new skills and practicing existing  
 skills, recognition, community, and passion for  
 the subject. GLAM crowdsourcing projects can  
 appeal to extrinsic and intrinsic motivations:  
 The same task (such as transcribing sections of a  
 historic document) could be undertaken for dif-  
 fering reasons: altruistic, such as “helping to  
 provide an accurate record” of national history  
 as represented in an online database of digitized  
 newspapers (Alam and Campbell 2012); intrin-  
 sic, such as solving the enjoyable puzzle of read-  
 ing eighteenth-century handwriting in a  
 correspondence; or extrinsic, as when an aca-  
 demic transcribes a quote from a primary  
 source.

*Trove*, the National Library of Australia’s  
 database of online resources (including digitized  
 newspapers), offers crowdsourcing functionality  
 that is closely aligned to the needs of users who  
 can correct text from the digitized originals for  
 their own uses. However, other users choose to  
 correct incorrectly transcribed text for the  
 intrinsic enjoyment of performing that task in  
 that context. This echoes findings by Dunn and  
 Hedges that the primary motivation in humani-  
 ties crowdsourcing can be altruistic, extrinsic, or  
 intrinsic, but it is nearly always strongly related  
 to the “project or activity’s subject area” (2012).

#### FROM TAGGING TO THEORIZING

There is a growing body of evidence that  
 crowdsourcing (or citizen science, or citizen his-  
 tory) can lead to deeper engagement with disci-  
 plines such as science or history, as well as an  
 increase in related skills and knowledge (see for  
 instance Dunn and Hedges 2012). Just as there



1 is value in a one-off contribution to a crowd-  
 2 sourcing project, there is also value in exercising  
 3 the skills required at the initial levels of partici-  
 4 pation. The possibility of building research and  
 5 synthesis skills, experience, and content knowl-  
 6 edge through participating in crowdsourcing is  
 7 an exciting opportunity for GLAMs. In this  
 8 section I look for useful definitions of “engage-  
 9 ment” and evidence for why some activities  
 10 engage audiences. I present some projects with  
 11 highly engaged participants who have in turn  
 12 found ways to connect more deeply with the  
 13 material, and I consider the role of emergent  
 14 communities in these projects.

15 Some cultural heritage crowdsourcing pro-  
 16 jects allow participants to graduate from tightly  
 17 scaffolded microtasks to higher cognitive pro-  
 18 cesses like explaining, relating, and theorizing  
 19 (Biggs 1999). Research into the citizen science  
 20 project *Galaxy Zoo* has led to the development  
 21 of a model: “Levels of Engagement.” At the first  
 22 level, volunteers participate in simple classifica-  
 23 tion tasks; at the second they participate in com-  
 24 munity discussion (for example, on a project  
 25 forum or blog), and at the third and final level  
 26 they move to “working independently on self-  
 27 identified research projects” (Raddick et al.  
 28 2009). Raddick et al. report that citizen science  
 29 research projects “have resulted in volunteers  
 30 teaching themselves about scientific content,  
 31 using tools of modern astronomy data, and  
 32 working as scientists.”

### 33 **DEFINING “ENGAGEMENT” IN CULTURAL** 34 **HERITAGE**

35 Many definitions of “engagement” in the  
 36 arts and cultural heritage simply seem to equate  
 37 to physical attendance at events or venues. A  
 38 more nuanced model comes from the United  
 39 Kingdom’s governmental agency, Department  
 40 for Culture, Media, and Sport, and its program  
 41 for Culture, Media, and Sport, and its program  
 42

titled “Culture and Sport Evidence” (CASE  
 2011). This research defines four types of  
 engagement, each building on the previous  
 level: 1) “*Attending*”—paying conscious, inten-  
 tional attention to content. 2) “*Participating*”—  
 an interaction that contributes to the creation of  
 content. 3) “*Deciding*”—making decisions about  
 the delivery of resources for content creation. 4)  
 “*Producing*”—creating content “which has a  
 public economic impact” (CASE 2011).

Other definitions draw directly from  
 museology. Bitgood found that engagement  
 involves “deep sensory-perceptual, mental and/  
 or affective involvement with exhibit content,”  
 possibly leading to “personal interpretation of  
 exhibit content,”—“meaning making,”—or a  
 “deep, emotional response” (2010). While  
 written in the context of physical encounters,  
 both the CASE model and Bitgood’s defini-  
 tion apply equally well to physical and online  
 visits or participation, and provide an explana-  
 tion for art historians’ sudden interest in astro-  
 labes.

### **CROWDSOURCING AS PRODUCTIVE** **ENGAGEMENT WITH CULTURAL** **HERITAGE**

We call what we do harvesting or catalogu-  
 ing, digitizing or preserving, data visualizing or  
 crowd-sourcing, community management or  
 customer service, or whatever the latest round of  
 restructuring has deemed our job to involve. But  
 what we’re really doing is working with people  
 to create and share back our collective and col-  
 laborative history. — Courtney Johnston (2011)

In an earlier issue of this journal, Owens  
 concluded that crowdsourcing is a powerful  
 tool for “deep engagement with the public”  
 (2013). Aside from the intrinsic enjoyment  
 discussed earlier, what is it about the scaffold-

1 ing, types of tasks, rewards, and community  
 2 around crowdsourcing in cultural heritage that  
 3 makes it so engaging? Some answers may lie in  
 4 the close, active viewing of objects, scientific  
 5 imagery, or historic documents, and the work  
 6 required to describe, categorize, or transcribe  
 7 them. Bitgood proposed a relationship  
 8 between engagement and “exertion or concen-  
 9 tration,” aided by a viewing time of “more than  
 10 a few seconds” (2010). Earlier research on  
 11 museum metadata games found that curiosity  
 12 about presented objects “was a compelling part  
 13 of the experience” (Ridge 2011a). Flanagan  
 14 and Carini stated that players of the *Tiltfactor*  
 15 metadata games “became so curious about the  
 16 images they were tagging” that they added tags  
 17 like “want to know more about this culture”  
 18 (2012).

19 Deep engagement can be its own reward.  
 20 “Flow” is experienced as a state of deep, enjoy-  
 21 able focus or engagement (Csikszentmihalyi  
 22 1990; Csikszentmihalyi and Hermanson 1995).  
 23 It requires a clear goal, immediate feedback on  
 24 the success of your attempts to reach that goal,  
 25 and a good match between the skills of the indi-  
 26 vidual and the challenges faced. Supporting  
 27 flow through content and interaction design  
 28 helps keep players engaged with an activity, and  
 29 therefore helps crowdsourcing projects be more  
 30 productive. It also points to one challenge of  
 31 maintaining participation levels in crowdsourc-  
 32 ing: When your skills are greater than the chal-  
 33 lenge, you become bored; but if you do not have  
 34 the skills to meet the challenge successfully,  
 35 then you experience anxiety. It can be difficult  
 36 to increase the challenge and provide sufficient  
 37 scaffolding so that skills and mastery grow with-  
 38 out compromising the quality of data. Some  
 39 projects have found ways to manage this  
 40 increase of skills and challenges. Providing  
 41 opportunities for increasing mastery is discussed  
 42 below.

## PROJECTS ENABLING DEEPER ENGAGEMENT

Dunn and Hedges observed that some pro-  
 jects support participants moving up a level to  
 “carry out more complex tasks” (2012). Long-  
 established or hugely popular crowdsourcing  
 projects like *Herbaria@Home* (2006), *Family-  
 Search* (2007), *Galaxy Zoo* (2007), *Founders and  
 Survivors* (2009) and *Old Weather* (2010)<sup>3</sup> have  
 had enough time and enrollment to demon-  
 strate ways in which project participants can  
 develop new skills and knowledge as a result of  
 their growing interest in the project source  
 material, or can graduate to more complex tasks  
 or bigger responsibilities.

For public participation in science, Bonney  
 et al. devised a useful model for categorizing  
 heritage crowdsourcing projects according to  
 the amount of control participants have over  
 project design processes (such as defining ques-  
 tions for study, collecting and analyzing data,  
 and drawing conclusions). Their model con-  
 tains three categories: “contributory,” in which  
 the public contributes data to a project designed  
 by the organization; “collaborative,” in which  
 the public can help refine project design and  
 analyze data in a project led by the organization;  
 and “co-creative,” in which the public can take  
 part in all or nearly all processes, and all parties  
 design the project together (Bonney et al.  
 2009). Most crowdsourcing projects are con-  
 tributory, but ones such as *Old Weather* and *Her-  
 baria@Home* have evolved into collaborative and  
 at least partially co-creative projects. It may be  
 that more collaborative project structures are a  
 factor in successfully encouraging deeper  
 engagement with related disciplines. Further  
 research is needed, but one measure of long-  
 term success in GLAM crowdsourcing may be a  
 willingness and ability to listen to a project’s user  
 communities and collaboratively devise new and

1 improved tasks and research questions. Samis  
 2 and Michaelson found that “a visitor centered  
 3 focus leads to organizational transformation”  
 4 (2013). The impact of collaborative and co-cre-  
 5 ative crowdsourcing projects on the sponsoring  
 6 organization is not yet clear, but it is probably  
 7 significant that each of the projects discussed  
 8 below has changed in response to participant  
 9 actions and comments.

### 11 **FamilySearch**

13 *FamilySearch* is a genealogy site that  
 14 encourages members of the public to “index”  
 15 (transcribe) historic records. The site aims to  
 16 get people to try a simple task—indexing  
 17 records—knowing that, as transcribers are  
 18 exposed to other people’s histories, they will  
 19 probably be gradually interested in finding out  
 20 more about their own families. This model of  
 21 encouraging engagement introduces people  
 22 who are not interested in family history (or who  
 23 are overwhelmed by it) to the skills required in  
 24 an initially closely scaffolded environment.  
 25 Davis points out that transcribing historical  
 26 documents “provides some much-needed,  
 27 introductory, family history education” and  
 28 increases the participants’ knowledge about the  
 29 range of record types and genealogical informa-  
 30 tion, while providing “handwriting practice”  
 31 (2012).

32 *FamilySearch* provides a further level of  
 33 involvement by inviting some established tran-  
 34 scribers to become “arbitrators” who can review  
 35 and approve the work of other transcribers.  
 36 Invitations to become an arbitrator are issued  
 37 after participants transcribe a certain number  
 38 of records with a sufficiently high accuracy  
 39 rate, or at the recommendation of a more  
 40 senior participant (Anderson 2012a; Anderson  
 41 2012b).

### **Old Weather**

The *Old Weather* project aimed to digitize  
 ship logs in order to analyze historic climatic  
 data. However, ship logs contain enough inter-  
 esting oddities that transcribers started to  
 become interested in the voyages, events, and  
 lives of those on the ships and in maritime his-  
 tory generally. Dunn and Hedges found that  
 transcribers were following these interests and  
 becoming expert in “specialized areas of naval  
 history” (2012). Posts on the *Old Weather* for-  
 ums are a good example of the mixture: help  
 with paleographic queries; explanation of sub-  
 ject-specific jargon; and curiosity about passing  
 references in the logs. These questions develop  
 into a deeper interest in the topic, an evolution  
 that characterizes citizen science and citizen  
 history projects. Participants have theorized  
 about questions including the relationship  
 between deaths onboard ship and successive  
 waves of the 1918-1919 influenza epidemic and  
 have written detailed guidelines for others who  
 wish to edit ship histories.<sup>4</sup>

### **Herbaria@Home**

*Herbaria@Home* aims to document histori-  
 cal herbarium collections in museums, based on  
 photographs of specimen sheets supplied by  
 museums. To date, participants have docu-  
 mented almost 125,000 herbarium specimens.  
 Some transcribers also became interested in the  
 people whose specimens they were document-  
 ing, and started collating their samples and  
 researching their lives. To support this new  
 research, the project expanded to include a wiki  
 of biographies of the original collectors, along  
 with samples of their handwriting from speci-  
 men sheets, forum posts, specimens collected,  
 and related people, places, and dates.

## Galaxy Zoo

The *Galaxy Zoo* project initially asked participants to classify images of galaxies into three simple groups, with more complex classifications added in successive stages (Raddick et al. 2009; Cardamone et al. 2009; Raddick et al. 2010; Romeo and Blaser 2011). After a burst of publicity led to an increase in enquiries, the *Galaxy Zoo* team launched a forum “to encourage volunteers to communicate with one another and answer each other’s questions” (Raddick et al. 2010). This turned out to have unexpected consequences. Through discussion and conjecture on the forum, project participants have devised “novel collaborative research projects,” developed their own analysis tools, and discovered “at least one truly unique object” (Raddick et al. 2010; Simpson 2013). Examples include a collaboration among members of the forum who became curious about objects they nicknamed “green peas,” collecting examples of them and campaigning to “give Peas a chance,”<sup>5</sup> eventually leading to the discovery of a new class of galaxy (Sheppard 2009; Cardamone et al. 2009). The forum also contains tales of the ways in which engagement with science has increased interest and changed lives: Participants have joined local astronomical societies, re-entered formal education to study astronomy, even changed careers. The *Galaxy Zoo* project has recently launched software tools to help “Zooites” interact and theorize “more deeply” with the data they have helped create (Simpson 2013).

## COMMUNITY AS SCAFFOLDING

The projects discussed above show the value in leaving room for curiosity to develop into deeper interest in the subject of a project (see also Csikszentmihalyi and Hermanson

1995). Providing different roles within a project—such as transcriber, data validator, or community support member—is an excellent method for dealing with challenges specific to crowdsourcing. (These challenges might include validating contributions with limited resources for community outreach, and content moderation.) It is also an excellent way to keep participants motivated and excited about new challenges and responsibilities. Projects that provide a variety of tasks and roles can support a range of different levels and types of participant skills, availability, knowledge, and experience. But designing crowdsourcing interfaces that are able to determine participant skills and motivations, and with enough flexibility to respond appropriately, is difficult with limited resources. Sharma and Hannafin write: “Software constraints often limit dynamic scaffolding to interactions that can be anticipated in advance” (2007).

However, as Dunn and Hedges observed, the “vibrant and interacting communities of contributors” that emerge around many crowdsourcing projects are a factor in their success: “Communities develop and perpetuate internal dynamics, self-correct [and] provide mutual support” (2012). An examination of participant forums shows that the community itself can produce some of the personalized scaffolding for learning or mastering skills and knowledge in subject domains that digital interfaces currently cannot support. Crowdsourcing projects that encourage community participation find that dialogue between experts and novices can provide additional scaffolding through “continuous and constructive interactions between experts and learners” (Sharma and Hannafin 2007). Looking to the future, machine learning and improved computational techniques for pattern recognition and visual processing may reduce the need for volunteers for currently popular crowdsourced tasks,

1 raising new ethical issues for cultural heritage  
 2 institutions, including their responsibility for  
 3 the communities that have developed around  
 4 and care deeply about their projects.

## 7 CONCLUSION

9 It is clear that crowdsourcing can be a pro-  
 10 ductive tool for completing digitization and  
 11 research tasks required by museums and cul-  
 12 tural heritage institutions. Projects that can  
 13 respond to the changing needs of their partici-  
 14 pants, by introducing new content or tasks, or  
 15 by offering new roles and responsibilities, help  
 16 people remain motivated to keep participating  
 17 and can even generate new research questions.  
 18 Crowdsourcing projects are also a powerful  
 19 platform for audience interaction with muse-  
 20 ums, offering truly deep and valuable engage-  
 21 ment with cultural heritage. As an opportunity  
 22 to “exercise knowledge, skills, and abilities that  
 23 might otherwise go unpracticed” (Clary et al.  
 24 1998), volunteering through GLAM crowd-  
 25 sourcing projects provides a platform for life-  
 26 long learning and an opportunity to engage  
 27 with cultural heritage content and tasks. In the  
 28 words of the project instigators of the New  
 29 York Public Library’s *What’s on the Menu?*:  
 30 “We are coming to see crowdsourcing not only  
 31 as a way to accomplish work that might not  
 32 otherwise be possible, but as an extension of  
 33 our core mission” (Lascarides and Vershbow,  
 34 forthcoming). Following in the steps of tradi-  
 35 tional volunteering, but with far wider and  
 36 deeper capabilities to reach and engage the  
 37 public, crowdsourcing helps museums serve  
 38 their core missions by providing platforms for  
 39 audiences to follow their own interests and  
 40 hobbies and connect with communities of  
 41 practice. **END**

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## NOTES

1. Reported in <http://openobjects.blogspot.com/2008/04/museum-and-claytons-audience.html> in a presentation based on Samis’s written paper, “Who Has the Responsibility for Saying What We See? Mashing up Museum, Artist, and Visitor Voices, On-site and On-line,” *Archives and Museum Informatics: Museums and the Web 2008*.
2. I am avoiding the term “gamification,” which is another problematic buzzword with contested definitions. At best, it describes “the use of game design elements in non-game contexts” (Deterding, Dixon, Khaled, and Nacke 2011); at worst it talks about gimmicky or exploitative design that produces what game developer Kathy Sierra calls “a short-term sugar rush of engagement followed by a crash” (2011).
3. Found, respectively, at <http://herbariaunited.org/atHome/>; <http://familysearch.org/>; <http://www.galaxyzoo.org/>; <http://foundersandsurvivors.org/>; <http://www.oldweather.org/>.
4. See <http://www.naval-history.net/OW-Ships-LogBooksWW1EDITGUIDE.htm>.
5. The original forum discussion is at <http://www.galaxyzooforum.org/index.php?topic=3638.0>. An outline of the community collaboration is at <http://www.galaxyzooforum.org/index.php?topic=270633.msg218401#msg218401>. Another example is the “Heartbeat Binary stars” discussion on the Planet Hunters citizen science project at

1 <http://talk.planethunters.org/discussions/DPH100suo7>.

## 2 REFERENCES

- 3  
4  
5  
6 Alam, Sultana, and John Campbell. 2012. Crowdsourcing motivations in a not-for-profit GLAM context: The Australian Newspapers Digitization Program. In *ACIS 2012: Location, Location, Location: Proceedings of the 23rd Australasian Conference on Information Systems 2012*, 1–11. Accessed at <http://dro.deakin.edu.au/eserv/DU:30049107/alam-crowdsourcingmotivations-2012.pdf>.
- 7  
8  
9  
10  
11 Anderson, Jen. 2012a. Arbitration results ruining your day? *FamilySearch Blog*. April 23. Accessed at <https://familysearch.org/blog/en/arbitration-results-ruining-day/>.
- 12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
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24  
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28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42
- . 2012b. Arbitration frequently asked questions. *FamilySearch Blog*. April 23. Accessed at <https://familysearch.org/blog/en/arbitration-frequently-asked-questions/>.
- Arends, Max, Josef Froschauer, Doron Goldfarb, Dieter Merkl, and Martin Weingartner. 2012. Analyzing user motivation in an art folksonomy. In *Proceedings of the 12th International Conference on Knowledge Management and Knowledge Technologies (i-KNOW '12)*. New York: ACM. Accessed at <http://doi.acm.org/10.1145/2362456.2362473>.
- Bernstein, Shelley. 2008. Tag! You're It! *Brooklyn Museum: Community: Bloggers@brooklynmuseum*. Oct. 1. Accessed at <http://www.brooklynmuseum.org/community/blogsphere/2008/08/01/tag-youre-it/>.
- . 2009. Crowdsourcing the clean-up with Freeze Tag! *Brooklyn Museum: Community: Bloggers@brooklynmuseum*. May 21. Accessed at <http://www.brooklynmuseum.org/community/blogsphere/2009/05/21/crowdsourcing-the-clean-up-with-freeze-tag/>.
- Biggs, John. 1999. What the student does: Teaching for enhanced learning. *Higher Education Research and Development* 18(1) (April): 57–75.
- Birchall, Danny, Martha Henson, Alexandra Burch, Daniel Evans, and Kate Haley Goldman. 2012. Levelling up: Towards best practice in evaluating museum games. In *Museums and the Web 2012*. San Diego, CA. Accessed at [http://www.museumsandtheweb.com/mw2012/papers/levelling\\_up\\_towards\\_best\\_practice\\_in\\_evaluati](http://www.museumsandtheweb.com/mw2012/papers/levelling_up_towards_best_practice_in_evaluati).
- Bitgood, Stephen. 2010. An attention-value model of museum visitors. Center for the Advancement of Informal Science Education. Accessed at [http://caise.insci.org/uploads/docs/VSA\\_Bitgood.pdf](http://caise.insci.org/uploads/docs/VSA_Bitgood.pdf).
- Bonney, Rick, Heidi Ballard, Rebecca Jordan, Ellen McCallie, Tina Phillips, Jenifer Shirk, and Candie C. Wilderman. 2009. Public participation in scientific research: Defining the field and assessing its potential for informal science education. A CAISE Inquiry Group Report. Washington, DC: Center for Advancement of Informal Science Education (CAISE). Accessed at <http://caise.insci.org/uploads/docs/PPSR%20report%20FINAL.pdf>.
- Brabham, Daren C. 2008. Moving the crowd at iStockphoto: The composition of the crowd and motivations for participation in a crowdsourcing application. *First Monday*. June 2. Accessed at <http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2159/1969>.
- Cardamone, Carolin, Kevin Schawinski, Marc Sarzi, Steven P. Bamford, Nicola Bennert, C. M. Urry, and Chris Lintott, et al. 2009. Galaxy Zoo Green Peas: Discovery of a class of compact extremely star-forming galaxies. *Monthly Notices of the Royal Astronomical Society* 399(3) (Nov.): 1191–1205.
- CASE. 2011. Evidence of what works: Evaluated projects to drive up engagement. January. London: Culture and Sport Evidence (CASE). Accessed at [http://www.culture.gov.uk/images/research/evidence\\_of\\_what\\_works.pdf](http://www.culture.gov.uk/images/research/evidence_of_what_works.pdf).
- Casual Games SIG. 2009. *2008-2009 Casual Games White Paper*. International Game Developers Association (IGDA). Accessed at [http://www.igda.org/sites/default/files/IGDA\\_Casual\\_Games\\_White\\_Paper\\_2008.pdf](http://www.igda.org/sites/default/files/IGDA_Casual_Games_White_Paper_2008.pdf).
- Causser, Tim, and Valerie Wallace. 2012. Building a volunteer community: Results and findings from *Transcribe Bentham*. *Digital Humanities Quarterly* 6(2). Accessed at <http://www>.

- digitalhumanities.org/dhq/vol/6/2/000125/000125.html.
- Clari, Michela, and Philip Graham. 2012. Learning to let go: Changing patterns of participation and learning through the Digital Collections of the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS). In *Museums and the Web 2012: Proceedings*, David Bearman and Jennifer Trant, eds. Accessed at [http://www.museumsandtheweb.com/mw2012/papers/learning\\_to\\_let\\_go\\_changing\\_patterns\\_of\\_partic](http://www.museumsandtheweb.com/mw2012/papers/learning_to_let_go_changing_patterns_of_partic).
- Clary, E. Gil, Mark Snyder, Robert D. Ridge, John Copeland, Arthur A. Stukas, Julie Haugen, and Peter Miene. 1998. Understanding and assessing the motivations of volunteers: A functional approach. *Journal of Personality and Social Psychology* 74(6) (June): 1516–1530.
- Csikszentmihalyi, Mihaly. 1990. *Flow: the Psychology of Optimal Experience*. New York: Harper and Row.
- Csikszentmihalyi, Mihaly, and Kim Hermanson. 1995. Intrinsic motivation in museums: Why does one want to learn? In *Public Institutions for Personal Learning: Establishing a Research Agenda*, John Falk and Lynn D. Dierking, eds., 66–77. Washington, DC: American Association of Museums.
- Dabbagh, Nada. 2003. Scaffolding: An important teacher competency in online learning. *TechTrends* 47(2): 39–44.
- Davis, Jessie. 2012. Stepping stones of genealogy. *FamilySearch Blog*. Nov. 20. Accessed at <https://familysearch.org/blog/en/stepping-stones-genealogy/>.
- De Boer, Victor, Michiel Hildebrand, Lora Aroyo, Pieter De Leenheer, Chris Dijkshoorn, Binyam Tesfa, and Guus Schreiber. 2012. Nichesourcing: Harnessing the power of crowds of experts. In *Proceedings of the 18th International Conference on Knowledge Engineering and Knowledge Management, EKAW 2012*, 16–20. Springer.
- Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. 2011. From game design elements to gamefulness. In *Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments – MindTrek 2011*, 9. New York, NY: ACM Press. Accessed at <http://dl.acm.org/citation.cfm?id=2181037.2181040>.
- Dunn, Stuart, and Mark Hedges. 2012. Crowdsourcing scoping study: Engaging the crowd with humanities research. London: King's College. Accessed at <http://www.humanitiescrowds.org>.
- Estelles-Arolas, E., and F. Gonzalez-Ladron-de-Guevara. 2012. Towards an integrated crowdsourcing definition. *Journal of Information Science* 38(2) (March): 189–200.
- Flanagan, Mary, and Peter Carini. 2012. How games can help us access and understand archival images. *American Archivist* 75(2): 514–537.
- Frankle, Elissa. 2011. More crowdsourced scholarship: Citizen history. *Center for the Future of Museums*. Accessed at <http://futureofmuseums.blogspot.co.uk/2011/07/more-crowdsourced-scholarship-citizen.html>.
- Holley, Rose. 2010. Crowdsourcing: How and why should libraries do it? *D-Lib Magazine* 16(3/4) (April). Accessed at <http://www.dlib.org/dlib/march10/holley/03holley.html>.
- Holmes, Kirsten. 2003. Volunteers in the Heritage Sector: A neglected audience? *International Journal of Heritage Studies* 9(4) (Dec.): 341–355.
- Howe, Jeff. 2006a. The rise of crowdsourcing. *Wired*, June. Accessed at [http://www.wired.com/wired/archive/14.06/crowds\\_pr.html](http://www.wired.com/wired/archive/14.06/crowds_pr.html).
- . 2006b. Crowdsourcing: A definition. June 2. Accessed at [http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing\\_a.html](http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html).
- Johnston, Courtney. 2011. Opening remarks for National Digital Forum 2011. *Best of 3*. Nov. 30. Accessed at <http://best-of-3.blogspot.com.au/2011/11/opening-remarks-for-national-digital.html>.
- Kosmala, Margaret. 2013. Some results from Season 4. *Snapshot Serengeti Blog*. Accessed at <http://blog.snapshotserengeti.org/2013/01/30/some-results-from-season-4/>.
- Lascarides, Michael, and Ben Vershbow. Forthcoming. What's on the Menu? Crowdsourcing at the New York Public Library.



- In *Crowdsourcing Our Cultural Heritage*, Mia Ridge, ed. Ashgate.
- Law, Edith, and Luis von Ahn. 2009. Input-agreement: A new mechanism for collecting data using human computation games. In *Proceedings of the 27th International Conference on Human Factors in Computing Systems*, 1197–1206. Boston, MA.
- Leadbeater, Charles, and Paul Miller. 2004. The Pro-Am revolution: How enthusiasts are changing our economy and society. Demos. Accessed at <http://www.demos.co.uk/publications/proameconomy>.
- McGonigal, Jane. 2008. *Engagement Economy: The Future of Massively Scaled Collaboration and Participation*. Sept. Palo Alto, CA: Institute for the Future.
- Moyle, Martin, Justin Tonra, and Valerie Wallace. 2011. Manuscript transcription by crowdsourcing: Transcribe Bentham. *Liber Quarterly* 20(3–4): 347–356.
- Nov, Oded. 2007. What motivates Wikipedians? *Communications of the ACM* 50(11): 60–64.
- Nov, Oded, Ofer Arazy, and David Anderson. 2011. Dusting for science: Motivation and participation of digital citizen science volunteers. In *Proceedings of the 2011 iConference 2011*, 68–74. Seattle, WA. Accessed at [http://iucontent.iu.edu.sa/Scholars/Information Technology/Nov Arazy Anderson Stardust iConference\\_final.pdf](http://iucontent.iu.edu.sa/Scholars/Information%20Technology/Nov%20Arazy%20Anderson%20Stardust%20iConference_final.pdf).
- Oomen, Johan, and Lora Aroyo. 2011. Crowdsourcing in the Cultural Heritage domain: Opportunities and challenges. In *Proceedings of the 5th International Conference on Communities and Technologies*, 138–149. Accessed at <http://www.cs.vu.nl/~marieke/OomenAroyoCT2011.pdf>.
- Oomen, Johan, Lotte Belice Baltussen, Sander Limonard, Maarten Brinkerink, Annelies Van Ees, Lora Aroyo, Just Vervaart, Kamil Afsar, and Riste Gligorov. 2010. Emerging practices in the Cultural Heritage domain: Social tagging of audiovisual heritage. In *Proceedings of the WebSci10: Extending the Frontiers of Society On-Line*. Raleigh, N.C. Accessed at [http://journal.webscience.org/337/2/websci10\\_submission\\_23.pdf](http://journal.webscience.org/337/2/websci10_submission_23.pdf).
- Owens, Trevor. 2013. Digital Cultural Heritage and the crowd. *Curator: The Museum Journal* 56(1) (Jan.): 121–130.
- Phillips, Carol. 2010. “Crowdsourcing” vs. “Community Sourcing.” *Millennial Marketing*. Sept. 10. Accessed at <http://millennialmarketing.com/2010/09/crowdsourcing-vs-community-sourcing/>.
- Poole, Nick. 2013. What are museums for? *Collections Link*. Jan. Accessed at <http://www.collectionslink.org.uk/discover/new-perspectives/1380-what-are-museums-for>.
- Preloaded. Undated. Case study: Launchball. *Preloaded*. Accessed at <http://preloaded.com/games/launchball/>.
- Proctor, Nancy. 2013. “Crowdsourcing—an introduction: From public goods to public good.” *Curator: The Museum Journal* 56(1) (Jan.): 105–106.
- Quinn, Alexander J., and Benjamin B. Bederson. 2011. Human computation: A survey and taxonomy of a growing field. In *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems*, 1403–1412. Accessed at <http://dl.acm.org/citation.cfm?id=1979148>.
- Raddick, M. Jordan, Georgia Bracey, K. Carney, G. Gyuk, K. Borne, J. Wallin, and S. Jacoby. 2009. Citizen science: Status and research directions for the coming decade. In *Astro2010: The Astronomy and Astrophysics Decadal Survey*, Vol. 2010. Accessed at <http://www8.nationalacademies.org/astro2010/DetailFileDisplay.aspx?id=454>.
- Raddick, M. Jordan, Georgia Bracey, Pamela L. Gay, Chris J. Lintott, Phil Murray, Kevin Schawinski, Alexander S. Szalay, and Jan Vandenberg. 2010. Galaxy Zoo: Exploring the motivations of citizen science volunteers. *Astronomy Education Review* 9(1): 18.
- Ridge, Mia. 2011a. Crowdsourcing games: Playing with museums. In *Museums at Play: Games, Interaction and Learning*, Katy Beale, ed. Edinburgh: MuseumsEtc.
- . 2011b. Playing with difficult objects: Game designs to improve museum collections. In *Museums and the Web 2011: Proceedings*, Jennifer



- 1 Trant and David Bearman, eds. Toronto,  
2 Canada: Archives and Museum Informatics.  
3 Accessed at [http://www.museumsandtheweb.com/mw2011/papers/playing\\_with\\_difficult\\_objects\\_game\\_designs\\_to](http://www.museumsandtheweb.com/mw2011/papers/playing_with_difficult_objects_game_designs_to).
- 4 Romeo, Fiona, and Lucinda Blaser. 2011. Bringing  
5 citizen scientists and historians together. In  
6 *Museums and the Web 2011: Proceedings*, Jennifer  
7 Trant and David Bearman, eds. Toronto,  
8 Canada: Archives and Museum Informatics.  
9 Accessed at [http://www.museumsandtheweb.com/mw2011/papers/bringing\\_citizen\\_scientists\\_and\\_historians\\_tog](http://www.museumsandtheweb.com/mw2011/papers/bringing_citizen_scientists_and_historians_tog).
- 10 Samis, Peter, and Mimi Michaelson. 2013.  
11 Meaning-making in nine acts. *Exhibitionist*  
12 (Spring): 54–59.
- 13 Sen, Shilad, Shyong K. Lam, Al Mamunur Rashid,  
14 Dan Cosley, Dan Frankowski, Jeremy  
15 Osterhouse, F. Maxwell Harper, and John Riedl.  
16 2006. Tagging, communities, vocabulary,  
17 evolution. *Proceedings of the 2006 20th*  
18 *Anniversary Conference on Computer Supported*  
19 *Cooperative Work—CSCW 2006*.
- 20 Sharma, Priya, and Michael J. Hannafin. 2007.  
21 Scaffolding in technology-enhanced learning  
22 environments. *Interactive Learning*  
23 *Environments* 15(1) (April): 27–46.
- 24 Sheppard, Alice. 2009. Peas in the universe, goodwill  
25 and a history of zooite collaboration on the Peas  
26 Project. *Galaxy Zoo*. July 9. Accessed at <http://blog.galaxyzoo.org/2009/07/07/peas-in-the-universe-goodwill-and-a-history-of-zooite-collaboration-on-the-peas-project/>.
- 27 Shirky, Clay. 2011. *Cognitive Surplus: Creativity and*  
28 *Generosity in a Connected Age*. London: Penguin.
- 29 ———. 2012. Pay attention to what Nick Denton is  
30 doing with comments. *Nieman Journalism Lab*.  
31 June 22. Accessed at <http://www.niemanlab.org/2012/06/pay-attention-to-what-nick-denton-is-doing-with-comments/>.
- 32 Sierra, Kathy. 2011. Comment on post “The Purpose  
33 of Gamification” by Gabe Zichermann. *O’Reilly*  
34 *Radar*. April. Accessed at <http://radar.oreilly.com/2011/04/gamification-purpose-marketing.html#comment-587245551>.
- 35 Simon, Nina. 2010. *The Participatory Museum*.  
36 Accessed at <http://www.participatorymuseum.org/chapter4/>.
- 37 Simpson, Robert. 2013. Zoo tools: A new way to  
38 analyze, view and share data. Accessed at <http://blog.zooniverse.org/2013/07/22/zoo-tools-a-new-way-to-analyze-view-and-share-data/>.
- 39 Snoek, Cees G. M., Bauke Freiburg, Johan Oomen,  
40 and Roeland Ordelman. 2010. Crowdsourcing  
41 Rock ‘n Roll multimedia retrieval. In *Proceedings*  
42 *of the International Conference on Multimedia*,  
1535–1538. New York: ACM. Accessed at  
<http://doi.acm.org/10.1145/1873951.1874278>.
- Terras, Melissa. 2010. Digital curiosities: Resource  
creation via amateur digitization. *Literary and*  
*Linguistic Computing* 25(4) (Oct.): 425–438.
- Trant, Jennifer. 2009. Tagging, folksonomy and art  
museums: Results of steve.museum’s research.  
Archives and Museum Informatics. Accessed at  
<http://conference.archimuse.com/files/trantSteveResearchReport2008.pdf>.
- von Ahn, Luis, and Laura Dabbish. 2004. Labeling  
images with a computer game. In *Proceedings of*  
*the 2004 Conference on Human Factors in*  
*Computing Systems—CHI 2004*, 319–326. New  
York: ACM Press. Accessed at doi:10.1145/  
985692.985733. <http://dl.acm.org/citation.cfm?id=985733> <http://portal.acm.org/citation.cfm?doid=985692.985733>.
- . 2008. Designing games with a purpose.  
*Communications of the ACM* 51(8) (Aug.): 57.

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<i>Instruction to typesetter</i>	<i>Textual mark</i>	<i>Marginal mark</i>
Leave unchanged	... under matter to remain	<u>stet</u>
Insert in text the matter indicated in the margin	^	^ followed by new matter
Delete	Ʒ through single character, rule or underline or Ʒ through all characters to be deleted	Ʒ
Substitute character or substitute part of one or more word(s)	Ƶ through letter or  ——  through characters	new character Ƶ or new characters Ƶ
Change to italics	— under matter to be changed	<u>ital</u>
Change to capitals	≡≡ under matter to be changed	<u>Caps</u>
Change to small capitals	≡≡ under matter to be changed	<u>sc</u>
Change to bold type	~ under matter to be changed	<u>bf</u>
Change to bold italic	~ under matter to be changed	<u>bf+ital</u>
Change to lower case	Ɔ	<u>lc</u>
Insert superscript	√	√ under character e.g. √
Insert subscript	^	^ over character e.g. ^
Insert full stop	⊙	⊙
Insert comma	↵	↵
Insert single quotation marks	↵ ↵	↵ ↵
Insert double quotation marks	↵ ↵	↵ ↵
Insert hyphen	=	=
Start new paragraph	¶	¶
Transpose	┌┐	┌┐
Close up	linking  characters	
Insert or substitute space between characters or words	#	#
Reduce space between characters or words	˘	˘